

MONTHLY NOTICES

OF THE

ROYAL ASTRONOMICAL SOCIETY.

VOL. XXXVIII.

FEBRUARY 8, 1878.

No. 4.

WILLIAM HUGGINS, Esq., F.R.S., President, in the Chair.

Henry Baumer, Esq., 27 Harley Street, W.;

Daniel Thomas Evans, Esq., 10 Kent Gardens, Castle Hill Park, Ealing, and 5 Elm Court, Temple;

John E. Griffith, Esq., Bangor;

Henry Burdett Hederstedt, Esq., M.I.C.E., 72 Lancaster Gate, W., and Lucknow, India;

Frederic G. Landon, Esq., M.A., 8 The Circus, Greenwich, S.E.;

John Ambrose Ridgway, Esq., Foundation School, Beverley;

Benjamin Templar, Esq., Birkdale, Southport; and

Richard Wilding, Esq., Associate Inst. of Actuaries, Cobridge, near Stoke-upon-Trent;

were balloted for and duly elected Fellows of the Society.

REPORT OF THE COUNCIL TO THE FIFTY-EIGHTH ANNUAL GENERAL MEETING OF THE SOCIETY.

Progress and present state of the Society:—

	Compounders.	Annual Subscribers.	Non-resident.	Mathematical Society.	Patroness.	Total Fellows.	Associates.	Grand Total.
December 31, 1876	212	353	5	7	1	578	42	620
Since elected ...	+ 9	+ 20	...	...	...	...	...	...
Deceased	− 6	− 6	− 1	− 1	...	...	− 5	...
Removals	+ 3	− 3
Resigned	− 11
Expelled	− 2
December 31, 1877	218	351	4	6	1	580	37	617

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Mr. Whitbread's Account as Treasurer of the Royal

RECEIPTS.

	£	s.	d.	£	s.	d.
Balance at Bankers', Dec. 31, 1876, as						
per Bankers' book ... £253	1	10				
Less amount of outstanding						
cheque 15	0	0				
	238	1	10			
„ in hand of Secretary of Library Committee:						
On account of Library Expenses ...	13	8	6			
„ Turnor Fund 22	3	9				
	273	14	1			
Dividend on £4,200 Consols 62	4	3				
„ £5,200 New 3 per cent. Stock ... 77	0	6				
„ £6,400 Consols 94	16	0				
„ £5,700 New 3 per cent. Stock ... 84	8	8				
	318	9	5			
Received on account of Subscriptions:						
Arrears of Contributions 108	3	0				
253 Contributions for 1877 531	6	0				
On account of ditto 2	0	0				
3 Contributions for 1878 6	6	0				
27 Admission Fees 56	14	0				
19 First Contributions 31	10	0				
	735	19	0			
10 Composition Fees 210	0	0				
Sales of Publications:						
At Society's Rooms, during 1877 ... 43	10	9				
At Williams & Norgate's, during 1876 ... 94	4	9				
	137	15	6			
Bequest of the late C. Lambert, Esq. 500	0	0				
	£2,175	18	0			

Astronomical Society from Dec. 31, 1876, to Dec. 31, 1877.

EXPENDITURE.

Salaries:—

	£	s.	d.	£	s.	d.
Editor of <i>Monthly Notices</i>	60	0	0			
Assistant Secretary	150	0	0			

				210	0	0
Income Tax and House Duty				6	11	3
Fire Insurance				7	16	6
Printing:—Spottiswoode & Co.				280	9	6
Engraving:—W. H. Wesley				11	4	0
Library expenses: Binding				93	0	0
Turnor Fund: Books purchased during year ...				20	16	10

Miscellaneous:—

House expenses	31	12	6			
Wages	23	8	0			
Stamps and postage	53	12	5			
Carriage of books and parcels	5	13	9			
Stationery and office expenses	9	14	1			
Expenses of meetings	17	15	6			
Coals and gas	48	11	9			
Fittings and repairs	6	14	2			
Mrs. Jackson-Gwilt's annuity	8	19	0			
Sundries	6	0	4			
				212	1	6
Paid on account of Mr. Gill's expedition to Ascension				400	15	6

Investments:—

Purchase of £200 Consols, at 96½, including Commission	193	5	0			
Purchase of £500 New 3 per cent. Stock at 95, including Commission	475	12	6			
				668	17	6
Balance at Bankers', Dec. 31, 1877, as per Bankers' book ... £240 19 9						
Less amount of out- standing cheque ... 15 0 0						
	225	19	9			
„ in hand of Secretary of Library Committee:						
On account of Library Expenses ...	20	8	6			
„ „ Turnor Fund	1	6	11			
„ in hand on Petty Cash account	13	11	7			
				261	6	9
„ due to Assistant Secretary on Petty Cash account Dec. 31, 1876				2	18	8
				£2,175	18	0

Examined and found correct.

J. KENNEDY ESDAILE.
A. AINSLIE COMMON.
WENTWORTH ERCK.

Assets and present property of the Society, January 1, 1878:—

	£	s.	d.	£	s.	d.
Balance at Bankers', Dec. 31, 1877	240	19	9			
Less amount of outstanding cheque	15	0	0			
				225	19	9
Due on account of Subscriptions:—						
1 Contribution of 6 years' standing	12	12	0			
1 " 5 " "	10	10	0			
6 " 4 " "	50	8	0			
12 " 3 " "	75	12	0			
36 " 2 " "	151	4	0			
45 " 1 " "	94	10	0			
Various amounts	10	14	0			
2 Admission Fees and First Contributions	6	6	0			
	411	16	0			
Less 3 Contributions paid in advance	6	6	0			
				405	10	0
Due for Publications				85	6	6
Due from Guarantors of Fund for the Expedition to Ascension				150	15	6
Balance in hand of Secretary of Library Committee on account of Library Expenses	20	8	6			
Do. do. on account of Turnor Fund	1	6	11			
In hand on Petty Cash account	13	11	7			
				35	7	0
£5,700 New 3 per cent. Stock, including Mrs. Jackson-Gwilt's gift (£300).						
£6,400 Consols, including the Lee Fund (£300), the Turnor Fund (£450), and the Horrox Memorial Fund (£100).						
Astronomical and other MSS., Books, Prints, &c.						
Various Astronomical Instruments, Models, &c.						
Two Gold Medals.						
Unsold Publications of the Society &c.						

Examined and found correct.

J. KENNEDY ESDAILE.

A. AINSLIE COMMON.

WENTWORTH ERCK.

REPORT OF THE AUDITORS.

We, the undersigned Auditors, appointed at the January 1878 meeting of the Royal Astronomical Society, beg to lay before this General Meeting the following Report:—

1. We have examined the Treasurer's account, and an account of the assets and other property of the Society, and have found and certified the same to be correct.

2. The receipts and expenditure for the past year are as stated in the Treasurer's account.

3. The balance in hand, including cash at bankers', amounts to 261*l.* 6*s.* 9*d.*

4. The funded property of the Society is in a satisfactory state, and has been increased during the past year by the sums of 500*l.* New 3 per Cents. and 200*l.* Consols. This latter amount

may be taken to include a sum of 121*l.* 18*s.* 8*d.*, being the amount of accumulated interest of the Turnor Fund now available for the specified purpose of the trust. The books, instruments, and other properties have been examined as far as circumstances would allow, and so far found in a satisfactory condition.

5. We have laid on the table a list of the names of those Fellows who are in arrear for sums due at the last Annual General Meeting, together with the amounts of the same.

J. KENNEDY ESDAILE,
A. AINSLIE COMMON,
WENTWORTH ERCK.

Stock in hand of volumes of the *Monthly Notices* :—

Vol.	At Society's Rooms.	At Williams & Norgate's.	Vol.	At Society's Rooms.	At Williams & Norgate's.
I.	76	2	XXI.	25	...
II.	97	2	XXII.	41	...
III.	...	...	XXIII.	25	...
IV.	...	...	XXIV.	27	...
V.	...	...	XXV.	8	...
VI.	54	1	XXVI.	15	...
VII.	3	...	XXVII.	2	...
VIII.	146	3	XXVIII.	82	2
IX.	28	3	XXIX.	65	1
X.	181	2	XXX.	76	5
XI.	189	2	XXXI.	112	3
XII.	15	2	XXXII.	145	4
XIII.	167	3	XXXIII.	128	4
XIV.	112	3	XXXIV.	103	7
XV.	132	2	XXXV.	29	5
XVI.	114	3	XXXVI.	59	1
XVII.	140	1	XXXVII.	73	3
XVIII.	172	...	Index to <i>Monthly Notices</i> }	610	...
XIX.	71	...			
XX.	42	...			

In addition to the above volumes of the *Monthly Notices*, the Society has a considerable stock of separate numbers of nearly all the volumes. With the exception, however, of Vols. XXXV., XXXVI., and XXXVII., no complete volumes can be formed from the separate numbers in stock. In order to facilitate the

completion of sets, the Council has, during the past session, resolved that separate numbers are to be sold at a shilling each, and in the case of volumes which can be supplied complete by the Society, the price of any number of parts of a single volume sold at any one time is not to exceed one shilling less than the price of the complete volume. With regard to the numbers of any volume of which the Society cannot supply the complete volume, all the numbers which can be supplied are to be sold for ten shillings to the public—a discretionary power being always left to the Assistant-Secretary to modify these rules in exceptional cases.

Stock in hand of volumes of the *Memoirs* :—

Vol.	At Society's Rooms.	At Williams & Norgate's.	Vol.	At Society's Rooms.	At Williams & Norgate's.
I. Part 1	3	...	XXII.	164	2
I. Part 2	48	...	XXIII.	160	1
II. Part 1	56	...	XXIV.	166	2
II. Part 2	23	...	XXV.	179	2
III. Part 1	71	...	XXVI.	182	2
III. Part 2	93	...	XXVII.	435	2
IV. Part 1	88	3	XXVIII.	397	1
IV. Part 2	98	3	XXIX.	424	2
V.	113	4	XXX.	173	1
VI.	132	4	XXXI.	158	1
VII.	156	3	XXXII.	180	1
VIII.	134	4	XXXIII.	179	3
IX.	143	3	XXXIV.	178	9
X.	154	1	XXXV.	129	3
XI.	166	1	XXXVI.	209	15
XII.	170	...	(with M.N.) XXXVI.	17	...
XIII.	180	...	(without) XXXVII.	376	9
XIV.	380	3	Part 1		
XV.	150	1	XXXVII.	324	6
XVI.	180	...	Part 2		
XVII.	156	4	XXXVIII.	322	...
XVIII.	160	1	XXXIX.	305	2
XIX.	165	1	Part 1		
XX.	163	2	XXXIX.	322	1
			Part 2		
XXI. Part 1	314	...	XL.	358	4
XXI. Part 2	99	...	XLII.	358	...
XXI. 1 & 2 (together)	69	2	XLIII.	487	11
			Index to <i>Memoirs</i>	676	4

Instruments belonging to the Society.

The following is a complete list of the instruments in the Society's apartments. A valuable Double Image Micrometer, which is given as No. 85 in the list, was presented to the Society in the course of the past year by Mr. Simms.

A circular has been sent to all persons having instruments belonging to the Society in their possession, in accordance with the resolution of the Council, mentioned in the last Annual Report.

The list of instruments is as follows :—

- | | | |
|-----|-----|---|
| No. | 1. | The <i>Harrison</i> clock, |
| „ | 2. | The <i>Owen</i> portable circles, by Jones, |
| „ | 3. | The <i>Beaufoy</i> circle, |
| „ | 4. | The <i>Beaufoy</i> transit instrument, |
| „ | 5. | The <i>Herschelian</i> 7-foot telescope, |
| „ | 6. | The <i>Greig</i> universal instrument, by Reichenbach and Ertel. The transit telescope, by Ultzschneider and Fraunhofer, of Munich, |
| „ | 7. | The <i>Smeaton</i> equatoreal, |
| „ | 8. | The <i>Cavendish</i> apparatus, |
| „ | 9. | The 7-foot Gregorian Telescope (late Mr. Shearman's), |
| „ | 10. | The Variation transit instrument (late Mr. Shearman's), |
| „ | 11. | The Universal quadrant, by Abraham Sharp, |
| „ | 12. | The <i>Fuller</i> theodolite, |
| „ | 13. | The Standard scale, by Troughton and Simms, |
| „ | 14. | The <i>Beaufoy</i> clock, No. 1, |
| „ | 15. | The <i>Beaufoy</i> clock, No. 2, |
| „ | 16. | The <i>Wollaston</i> telescope, |
| „ | 17. | The <i>Lee</i> circle, |
| „ | 18. | The <i>Sharpe</i> reflecting circle, |
| „ | 19. | The <i>Brisbane</i> circle, |
| „ | 20. | The <i>Baker</i> universal equatoreal, |
| „ | 21. | The <i>Reade</i> transit, |
| „ | 22. | The <i>Matthew</i> equatoreal, by Cooke, |
| „ | 23. | The <i>Matthew</i> transit instrument, |
| „ | 24. | The <i>South</i> transit instrument, |
| „ | 25. | A Quadrant, by Bird (formerly belonging to Captain Cook), |
| „ | 26. | A globe showing the Precession of the Equinoxes. |
- The *Sheepshanks* collection :—
- | | | |
|---|-----|---|
| „ | 27. | (1.) 30-inch transit instrument, by Simms, with level and two iron stands. |
| „ | 28. | (2.) 6-inch transit theodolite, with circles divided on silver; reading microscopes, both for altitude and azimuth; cross and siding levels; magnetic needle; plumbline; portable clamping foot and tripod stand. |

- No. 29. (3.) $4\frac{6}{10}$ -inch achromatic telescope, about 5 feet 6 inches focal length; finder; rack motion; double-image micrometer; two other micrometers; one terrestrial and ten astronomical eyepieces, applied by means of two adapters, with equatoreal stand, clock movement.
- „ 30. (4.) $3\frac{1}{4}$ -inch achromatic telescope, with equatoreal stand; double-image micrometer; one terrestrial and three astronomical eyepieces.
- „ 31. (5.) $2\frac{3}{4}$ -inch achromatic telescope, with stand; one terrestrial and three astronomical eyepieces.
- „ 32. (6.) $2\frac{3}{4}$ -inch achromatic telescope, about 30 inches focal length; one terrestrial and four astronomical eyepieces. This instrument was lent to the late Rev. J. Cape, and is believed to be lost.
- „ 33. (7.) 2-foot navy telescope.
- „ 34. (8.) A transit instrument of 45 inches focal length; with iron stand, and also Ys for fixing to stone piers; two axis levels.
- „ 35. (9.) Repeating theodolite, by Ertel, with folding tripod stand.
- „ 36. (10.) 8-inch pillar sextant, by Troughton, divided on platinum, with counterpoise stand and artificial horizon.
- „ 37. (11.) Portable zenith telescope and stand, $2\frac{3}{4}$ -inch aperture and 26 inches focal length; 10-inch horizontal circle and 8-inch vertical circle, read to $10''$ by two verniers to each circle.
- „ 38. (12.) 18-inch Borda repeating circle, by Troughton, $2\frac{1}{8}$ -inch aperture and 24 inches focal length; the circles divided on silver, the horizontal circle being read by four verniers, and the vertical circle by three verniers, each to $10''$.
- „ 39. (13.) 8-inch vertical repeating circle, with diagonal telescope, by Troughton and Simms; circle divided on silver, reading to $10''$; a 5-inch circle at eye-end reading to single minutes; horizontal circle 9 inches diameter in brass, reading to single minutes.
- „ 40. (14.) A set of surveying instruments, consisting of a 12-inch theodolite for horizontal angles only, reading to $10''$; two sets of adjusting plates: tripod stand with enclosed telescope; a deal box with heavy stand for theodolite; a box containing the Y piece of level; two large and three small ground-glass bubbles divided; a box containing level collimator, object-glass $1\frac{5}{8}$ -inch diameter and 16 inches focal length; micrometer eyepiece, comb, and wires.
- „ 41. (15.) Level collimator with object-glass $1\frac{7}{8}$ -inch diameter and 16 inches focal length; stand, rider-level, and fittings.

- No. 42. (16.) 10-inch reflecting circle, by Troughton, reading by three verniers to 20''; counterpoise stand; artificial horizon with mercury; two tripod stands.
- „ 43. (17.) Hassler's reflecting circle, by Troughton, with counterpoise stand.
- „ 44. (18.) 6-inch reflecting and repeating circle, by Troughton and Simms, contained in three boxes, two of which form stands. The circle is divided on silver, and is read to single minutes; two inside arcs divided to single degrees, 150 degrees on each side; artificial horizon and mercury.
- „ 45. (19.) 5-inch reflecting and repeating circle, by Lenoir, of Paris.
- „ 46. (20.) Reflecting circle, by Jecker, of Paris, 11 inches in diameter, with one vernier reading to 15''.
- „ 47. (21.) Box sextant; reflecting plane and level.
- „ 48. (22.) Prismatic compass, by Troughton and Simms.
- „ 49. (23.) Mountain barometer.
- „ 50. (24.) Prismatic compass, by Thomas Jones, mounted with a cylindrical lens.
- „ 51. (25.) Ordinary 4½-inch compass with needle.
- „ 52. (26.) Dipping needle, by Robinson.
- „ 53. (27.) Compass needle, mounted for variation.
- „ 54. (28.) Magnetic intensity needle, by Meyerstein, of Göttingen; a strongly fitted brass box with heavy magnet; filar suspension.
- „ 55. (29.) Box of magnetic apparatus.
- „ 56. (30.) Hassler's reflecting circle, by Troughton; a 10½-inch reflecting and repeating circle, with stand and counterpoise, divided on platinum with two movable and two fixed indices; four verniers reading to 10''.
- „ 57. (31.) Box sextant and glass plane artificial horizon, by Troughton and Simms.
- „ 58. (32.) Plane 2½-inch speculum, artificial horizon, and stand.
- „ 59. (33.) 2½-inch circular level horizon, by Dollond.
- „ 60. (34.) Artificial horizon, roof, and trough; the trough 8¼ by 4¼ inches.
- „ 61. (35.) Set of drawing instruments, consisting of 6-inch circular protractor and common protractor, T-square: one beam compass.
- „ 62. (36.) A pentagraph.
- „ 63. (37.) A noddly.
- „ 64. (38.) A small Galilean telescope, with object-glass of rock crystal.
- „ 65. (39.) Five levels.
- „ 66. (40.) 18-inch celestial globe.
- „ 67. (41.) Varley stand for telescope.
- „ 68. (42.) Thermometer.

- No. 69. (43.) Telescope, with the object-glass of rock crystal.
- „ 70. Portable equatoreal stand.
- „ 71. Portable altazimuth tripod.
- „ 72. Four polarimeters.
- „ 74. Registering spectroscope, with one large prism.
- „ 76. Two five-prism direct-vision spectroscopes.
- „ 78. $9\frac{1}{4}$ -inch silvered-glass reflector and stand, by Brown-
ing.
- „ 79. Spectroscope.
- „ 80. A small box, containing three square-headed Nicol's
prisms; two Babinet's compensators; two double-
image prisms; three Savarts; one positive eyepiece,
with Nicol's prism; one dark wedge.
- „ 81. A back-staff, or Davis' quadrant.
- „ 82. A nocturnal, or star dial.
- „ 83. An early non-achromatic telescope, of about 3 feet
focal length, in an oak tube made in one piece. The
words "Samuel Scatliffe, Londini, Fecit," are
engraved on the draw-tube of the eyepiece.
- „ 84. A Hollis observing chair.
- „ 85. A double image micrometer, by Troughton and
Simms.

The following instruments, which were not included in the list published in last year's Annual Report, are also in the possession of the Society:—

- No. 86. A $4\frac{1}{2}$ -inch Gregorian Reflecting Telescope, by Short,
of London, with an altazimuth stand with 6-inch
divided altitude and azimuth circles, extra small
mirror, and two eyepieces.
- „ 87. A $3\frac{1}{4}$ -inch Gregorian Reflecting Telescope with
wooden tripod stand.
- „ 88. A pendulum with 5-foot brass suspension rod, work-
ing on knife edges, by Thomas Jones. This was one
of the instruments used by Sir E. Sabine in his pen-
dulum experiments.
- „ 89. A Rhabdological Abacus. A contrivance invented
by Mr. H. Goodwyn. It consists of a box filled with
compartments, in which are square rods covered with
numbers, which can be arranged so as to facilitate the
labour of multiplying high numbers.
- „ 90. A bronze celestial globe, not quite six inches in
diameter, covered with Arabic characters. The stars
are represented by small inlaid pieces of whiter
metal. The globe is surrounded by a metal divided
circle, also engraved with Arabic characters.
- „ 91. An astronomical time watch-case, by Professor
Chevallier, being a box with a lid with a circular
aperture, through which the hands of a watch may
be seen. Upon the lid is a plate engraved with a
double circle of hours, which may be set so as to in-

dicare sidereal time when the watch is going to ordinary mean time.

- No. 92. A 2-foot protractor, with two movable arms, and vernier.
 „ 93. A beam compass, in box.
 „ 94. A 2-foot navigation scale.
 „ 95. Stand for testing measures of length. It consists of two T-shaped gun-metal bars $5\frac{1}{2}$ feet long, to which are fitted two micrometers mounted with adjusting screws for level and position.

The following instruments are lent, during the pleasure of the Council, to the undermentioned persons:—

- No. 2. The *Owen* portable circle, No. 1, to Mr. Lecky.
 „ 4. The *Beaufoy* transit instrument, to the Observatory, Kingston, Canada.
 „ 12. The *Fuller* theodolite, to the Director of the Sydney Observatory.
 „ 22. The *Matthew* equatoreal, to Mr. Brett.
 „ 23. The *Matthew* transit, to Mr. Gill, for the Expedition to Ascension.
 „ 74. The registering spectroscope, with prism, to Mr. Lecky.
 „ 81. *Davis'* quadrant, to Mr. Lecky.

From the *Sheepshanks* collection:—

- „ 31. No. 5, to Mr. Birt.
 „ 34. No. 8, to the Rev. Professor Pritchard.
 „ 35. No. 9, to the Sydney Observatory.
 „ 43. No. 17, to Mr. Gill, for the Expedition to Ascension.
 „ 67. No. 41, to the Rev Professor Pritchard.
 „ 69. No. 43, to Dr. Huggins.

Missing Instruments.

Instruments Nos. 64, 66, and 71, which were mentioned in the last *Annual Report* as missing, have been found, but the Council have to regret that no information with regard to the remaining five instruments which appear in the last two *Annual Reports* as missing has been obtained. During the lifetime of the late Assistant Secretary no book was kept for the purpose of recording the loan and return of instruments belonging to the Society, but some letters applying for the loan of instruments, and memoranda made by the late Mr. Williams upon separate pieces of paper, giving information with respect to the instruments lent by the Society, have been preserved. These have been carefully examined, but no further information has been derived with regard to the missing instruments. The Council have therefore directed that the following instruments shall be removed from the list:—

- No. 11. Universal Quadrant, by Abraham Sharp. (First mentioned in the *Report* of the Council published in 1847. There is no record of the instrument having been lent, and no information with regard to it can be obtained.)
- No. 22. The *Reade* Transit. (First mentioned in the Council's *Report* for 1870. No information can be obtained with regard to it, and there is no record of its having been lent.)
- No. 32. *Sheepshanks* instrument No. 6. (Lent to the Rev. Jonathan Cape in 1858. There is no entry of its return to the Society. Mr. Cape died in 1872, and his instruments were sold by auction shortly afterwards, but all efforts which have been made to trace the instrument have been unsuccessful. See p. 127 of Vol. XXXVI. of the *Monthly Notices*.)
- No. 68. A Thermometer. (This is one of the instruments presented to the Society by Miss Sheepshanks. No information can be obtained with regard to it.)

The Gold Medal.

The Council have awarded the Society's Gold Medal to Baron Dembowski, of Gallarate, near Milan, for his Researches on Double Stars. The President will lay before the Meeting the grounds upon which the Council have decided upon their award.

Mr. Lambert's Bequest.

During the past year the treasurer has received the sum of 500*l.* from Mr. C. J. Lambert, a son of the late Mr. C. Lambert, F.R.A.S., whose name appears in the list of deceased Fellows mentioned in last year's Annual Report. Mr. C. Lambert left by his will a sum of 25,000*l.* at the disposal of his son to be distributed amongst persons who had been in his employ and in gifts to scientific societies. Out of this sum Mr. C. J. Lambert appropriated to the Astronomical Society the sum of 500*l.*, which was paid free of legacy duty. The Council has thus the pleasure of reporting that the funded property of the Society has, within the course of the last two years, been increased by legacies amounting to 2,580*l.*, viz. the Janson legacy, 200*l.*; the Carington legacy, 2,000*l.* Consols, valued at 1,880*l.*; and the Lambert bequest, 500*l.*

Mr. Gill's Expedition for observing the Opposition of Mars.

During the past year Mr. David Gill applied to the Council to aid him in carrying out an expedition which he proposed to make to the Island of Ascension for observing the opposition of *Mars* that was about to take place. Lord Lindsay had placed at his disposal the Heliometer which he had made use of in observing the opposition of *Juno* in the Mauritius, and Mr. Gill offered, in addition to giving his own services, to defray any expenses which might be incurred beyond 500*l.*

The value of this opposition for determining the Sun's distance may be gathered from the following numbers, showing the distance of *Mars* from the Earth expressed in the unit of the Earth's distance from the Sun at the various oppositions of the planet till the year 1892. At the opposition of 1877 the distance of *Mars* was .37; in 1879 it will be .48; in 1881-2, .60; in 1884, .67; in 1886, .76; after which the distance continually diminishes till the opposition of 1892, when it will be reduced to .38.

The Council, having regard to the favourable conditions of this opposition and to the trifling cost of such an expedition as compared with the expenditure necessary for the observation of a transit of *Venus*, as well as to the circumstances connected with Mr. Gill's offer, resolved to grant a sum of 250*l.* out of the funds of the Society towards the expenses of the expedition, and they are happy to be able to state that the remaining 250*l.* has since been granted out of the Government fund at the disposal of the Royal Society. Fellows of the Society will be aware, from the reports which have from time to time appeared in the pages of the *Monthly Notices*, that the expedition has been carried out with much energy by Mr. Gill and has been brought to a successful issue.

The Library.

During the past year the binding of the Society's books has been systematically proceeded with. Five hundred and one volumes have been bound in a substantial manner. Most of the publications of Observatories, and the series of Transactions of Learned Societies, are now bound; but there still remains a large number of tracts and volumes which require binding.

One hundred and twenty-two volumes (including tracts) have been purchased out of the Turnor Fund during the past year. Some of the *lacunæ* in serial publications have been filled up, but many still remain; and the Council take this opportunity of drawing the attention of Fellows possessing odd numbers of the *Astronomische Nachrichten* and other astronomical publications,

to the list of missing numbers and volumes of serials, which may be seen on application to the Assistant-Secretary.

The Library Committee is anxious to complete, as far as possible, the Society's collections of Star Catalogues, Atlases, and other works of astronomical reference. It is also thought desirable that the library should contain the chief modern English and Foreign books upon popular astronomy, and it is hoped that in the future the library will be rendered much more complete in this respect by means of donations as well as purchases. Such books are very frequently borrowed from the library by Fellows, and in the case of some of the popular treatises it would be an advantage if the Society possessed duplicate copies, one for reference in the library and one for loan.

The number of books taken out of the library during the past year is greatly in excess of the number taken out in any previous year, and the Council congratulate themselves that the library is also much more freely used than formerly for purposes of reference.

Only one application for the loan of MSS. belonging to the Society has been received during the past year, but the thirty-nine volumes of Heinrich Schwabe's Sun Spot MSS. are still at the Kew Observatory.

The regulation of the Council that "It shall be the duty of the Assistant-Secretary, before the November meeting, to forward to all Fellows of the Society who, according to the entries in the book kept for that purpose, have any books belonging to the Society in their possession, a letter requesting that all such books be returned to the Society on or before the day of the November meeting," has been carried out, and in every instance the books have either been returned or answers have been received acknowledging their possession and requesting a further loan of them.

Publications of the Society.

Of vol. xli. of the *Memoirs*, which relates to observations made during total solar eclipses, the first four hundred and eighty pages are printed. The remainder of the volume, which will amount to rather more than two hundred pages, is already partly in type, and the Council have reason to hope that the complete volume will be in the hands of the Fellows in the course of two or three months. The part already printed contains collected accounts of observations made previously to totality; observations made about the time of the commencement and towards the end of totality; observations relating to the brightness of the corona; polariscopic, spectroscopic, and some other classes of observations made during totality.

The part which is not yet printed will contain a discussion of the principal drawings and photographs of the corona made up

to the year 1871; a catalogue of the eclipse observations which have been referred to in compiling the volume; a general Index; and seventeen quarto plates of photographs of the corona, and of the structure visible in the corona photographs of 1871.

Volume xliii. of the *Memoirs* was published in November. It contains the six following Papers:—

I. *The Chronology of Star Catalogues.* By E. B. Knobel, Esq.

This paper contains a list of 530 star catalogues arranged in order of epoch, and gives very complete information with regard to the number of stars in each catalogue, the date of publication, the magnitudes and special peculiarities of the stars described, particulars as to their positions and the coordinates given, the epoch which is the basis of the arrangement adopted, and general notes, with references to the works in which the catalogues are to be found.

All the star catalogues in the list, with the exception of a few ancient and Oriental catalogues, have been personally examined by Mr. Knobel, and his notes upon the earlier Arabian and Persian astronomers contain much curious information.

The table of catalogues is followed by a list of twenty-nine catalogues of proper motions of stars, and by Aboul Hhassan's "Table of the longitudes and latitudes of 240 stars for the commencement of the Hegira," with critical notes on the stars, and a list of Arabic errata in the translation of this catalogue and that of Ulugh Beigh.

II. *Micrometrical Measures of Double Stars.* By George Knott, Esq.

III. *Second Catalogue of Micrometrical Measures of Double Stars made at the Temple Observatory.* By J. M. Wilson, M.A., and G. M. Seabroke, Esq.

IV. *Theory of the Horizontal Photoheliograph, including its application to the determination of the Solar Parallax by means of Transits of Venus.* By Prof. William Harkness, U. S. Navy.

V. *The Sidereal System.* By Maxwell Hall, M.A., of Pembroke College, Cambridge.

VI. *Mémoire sur la Période commune à la Fréquence des Taches Solaires et à la Variation de la Déclinaison Magnétique.* Par M. le Docteur Rudolf Wolf.

This paper contains the general results of Dr. Wolf's researches in connection with the periodicity in the development of Sun-spots, and is accompanied by a diagram showing the form of the Sun-spot curve as determined from records which Dr. Wolf has examined, dating from 1745 to the present time. A table is also given, showing the dates of maxima and minima of Sun-spot development from 1610 to the present time. From this table Dr. Wolf shows that the length of the mean Sun-spot period is 11.111 years, and that the average divergence of maxima and

minima from the mean period is 2'030 years. The paper contains a list of the MSS. and printed records which Dr. Wolf has consulted in compiling the above table and curve, and shortly explains the methods he has adopted in reducing the observations of so many observers to the same tabular form.

Most of the information given in the paper has already been published in German in the pages of the *Astronomische Mittheilungen*, but the Council hope that the astronomical public will welcome Dr. Wolf's important results in a more concise and accessible form than they have hitherto appeared.

In the numbers of the *Monthly Notices* published during the past year many valuable papers have appeared, amongst which will be noticed several communications from foreign astronomers.

Retirement of Treasurer.

The Council desire to express their regret that Mr. S. C. Whitbread should have been compelled by ill health to resign the office of Treasurer, which he has held for the last twenty years so much to the advantage of the Society. The Council have expressed to Mr. Whitbread their sense of the value of the services that he has rendered to the Society, and their sympathy with him in his enforced retirement from the office of Treasurer.

OBITUARY.

The Council regret that they have to record the loss by death of the following Fellows and Associates during the past year:—

Fellows :—Rev. H. A. S. Atwood.
 Sir Edward Belcher.
 J. W. Bosanquet.
 J. S. Bowerbank.
 O. G. Downes.
 J. L. Kenworthy.
 Captain H. O'Reilly.
 Rev. W. L. Onslow.
 W. J. Rideout.
 Rev. F. W. Russell.
 W. H. Fox Talbot.

Associates :—Dr. C. Bremiker.
 Dr. E. Heis.
 U. J. J. Le Verrier.
 Prof. K. von Littrow.
 Prof. G. Santini.